REMARKS/ARGUMENTS

Applicant thanks Examiner for the detailed Office Action dated March 22, 2007. In response to the issues raised, the Applicant offers the following submissions and amendments.

Amendments

Claims 1, 17 and 33 have been amended to incorporate the features previously defined in claims 6, 22 and 36. In light of this, claims 6, 22 and 36 have been cancelled.

The specification has been amended at page 1 to include the 'CROSS REFERENCE TO RELATED APPLICATIONS' section.

Accordingly, the amendments do not add any new matter.

35 U.S.C. §102

Claims 1 to 3, 5, 6, 8, 16 to 19, 21, 22, 24, 32 to 37, 39 and 47 stand rejected for lack of novelty in light of US 5,706,041 to Kubby.

Amended independent claims 1, 17 and 33 define the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. The bubble generated is not spherical but generally conforms to the shape of the heater element. With the broad opposing sides of the planar beam arranged parallel to the nozzle aperture, the bubble has a relatively broad flat surface that moves normal to the plane of the nozzle. Hence the pressure pulse through the ink in the chamber also has a broader and flatter configuration that ejects a droplet with greater efficiency and better directionality.

The Kubby printhead is known as a 'side-shooter' printhead as the droplet trajectory is parallel to the plane of deposition of the printhead IC structures. This is fundamentally different from the 'roof-shooter' configuration of the present invention. Ejecting droplets from the side of the printhead IC effectively precludes a close-packed 2-dimensional array of nozzles. This has a large impact on the overall printhead size and or print speed if the print quality is to be comparable to that of a roof shooter with high nozzle density. However, it is a simple matter to suspend the heater over a trench or local depression in the side-shooter format. Heater suspension in a roof-shooter requires a more involved fabrication process with a final removal of all sacrificial material through the nozzle aperture.

The Kubby heater creates a pressure pulse that moves through the ink at a skewed angle to the ejection aperture. Accordingly the ink droplet ejected by the skewed pulse is more likely to have poor directionality. Drop trajectories that deviate from normal to the plane of the ejection aperture are detrimental to the print quality.

In light of the above, the cited reference fails to disclose the elements defined by amended claims 1, 17 and 33. Likewise, Kubby does not anticipate any of dependent claims 2, 3, 5, 6, 8, 16, 17 to 19, 21, 22, 24, 32, 34 to 37, 39 and 47

35 U.S.C. §103

Claims 4, 7, 10 to 12, 20, 23, 26 to 28, 38 and 41 to 43 stand rejected as obvious in light of US 5,706,041 to Kubby in view of US 6,019,457 to Silverbrook.

As discussed above, amended claims 1, 17 and 33 highlight that the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. As discussed above, this allows the vapor bubble to generate a pressure pulse with a broader and flatter configuration to eject a droplet with greater efficiency and better directionality while thermally insulating the heater from the wafer substrate. Neither of the citations teaches nor suggests these considerations. Claims 4, 7, 10 to 12, 20, 23, 26 to 28, 38 and 41 to 43 all directly or indirectly depend from independent claims 1, 17 and 33. It follows that the citations do not disclose all the elements of the dependent claims.

Claims 9, 25 and 40 stand rejected as obvious in light of US 5,706,041 to Kubby in view of US 6,543,879 to Feinn et al.

As discussed above, amended claims 1, 17 and 33 highlight that the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. As discussed above, this allows the vapor bubble to generate a pressure pulse with a broader and flatter configuration to eject a droplet with greater efficiency and better directionality while thermally insulating the heater from the wafer substrate. Neither of the citations teaches nor suggests these considerations. Claims 9, 25 and 40 all directly or indirectly depend from independent claims 1, 17 and 33. It follows that the citations do not disclose all the elements of the dependent claims.

Claims 13, 29 and 44 stand rejected as obvious in light of US 5,706,041 to Kubby in view of US 4,965,594 to Komuro.

As discussed above, amended claims 1, 17 and 33 highlight that the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. As discussed above, this allows the vapor bubble to generate a pressure pulse with a broader and flatter configuration to eject a droplet with greater efficiency and better directionality while thermally insulating the heater from the wafer substrate. Neither of the citations teaches nor suggests these considerations. Claims 13, 29 and 44 all directly or indirectly depend from independent claims 1, 17 and 33. It follows that the citations do not disclose all the elements of the dependent claims.

Claims 14, 30 and 45 stand rejected as obvious in light of US 5,706,041 to Kubby in view of The Fabrication and Reliability Testing of Ti/TiN Heaters by DeMoor et al.

As discussed above, amended claims 1, 17 and 33 highlight that the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. As discussed above, this allows the vapor bubble to generate a pressure pulse with a broader and flatter configuration to eject a droplet with greater efficiency and better directionality while thermally insulating the heater from the wafer substrate. Neither of the citations teaches nor suggests these considerations. Claims 14, 30 and 45 all directly or indirectly depend from independent claims 1, 17 and 33. It follows that the citations do not disclose all the elements of the dependent claims.

Claims 15, 31 and 46 stand rejected as obvious in light of US 5,706,041 to Kubby in view of US 5,969,005 to Yamashita et al.

As discussed above, amended claims 1, 17 and 33 highlight that the heater element to be a planar beam suspended such that it is parallel to the plane of the ejection aperture of the corresponding nozzle. As discussed above, this allows the vapor bubble to generate a pressure pulse with a broader and flatter configuration to eject a droplet with greater efficiency and better directionality while thermally insulating the heater from the wafer substrate. Neither of the citations teaches nor suggests these considerations. Claims 15, 31 and 46 all directly or indirectly depend from independent claims 1, 17 and 33. It follows that the citations do not disclose all the elements of the dependent claims.

Pursuant to the above, the cited references do not support a §103 rejection of any of the dependent claims.

It is respectfully submitted that the Examiner's objections and rejections have been successfully traversed and the application is now in condition for allowance. Accordingly, favorable reconsideration is courteously solicited.

Very respectfully

Applicants

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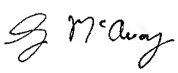

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